FOSSIL JAW OF
RHINOCEROIDES ALLEGHANIENSIS

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OF

GEOLOGY*

AND NATURAL SCIENCE.

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PROSPECTUS.

NATURAL HISTORY, at this time, engrosses a conspicuous portion of the literature of Europe. In our own country, at no period of its history, has a growing inclination for the study of nature manifested itself so decidedly as at this moment. We perceive this, in the favour with which numerous European republications are received here; in the general solicitude for an accurate exposition of the geology of this continent, and the impatience of our naturalists, restrained as they are from bringing forward, fairly and intelligently, the phenomena of American nature, and comparing them with those of trans-atlantic countries.

In Europe, naturalists form an extensive community, governed by the pure love of the science of nature. There is not a branch of natural knowledge that is not under investigation there, by men eminent in science. The study of the structure of our planet, and of the causes of those frequent renewals of its ancient surfaces; the dawnings of vegetable and animal organization, and their subsequent progress in functionary importance through those ancient surfaces, to the last order of creation, where man appears; the relation in which organized bodies have at all times stood to each other, both in respect to structure and subsistence; and their general manifestation of the benevolence and power of God: in all these branches of natural knowledge, the European philosophers have deeply engaged themselves, drawing their illustrations indifferently from every part of their continent.

Amidst these general contributions to science, it is painful to

* At the suggestion of numerous friends we have added the word *Geology* to our title.

perceive what conspicuous blanks are yet left for America to fill up, and especially in those important branches, American geology and American organic remains. This feeling is greatly increased by the occasional taunts and sneers we see directed against us, in foreign scientific works. They are aimed, it is true, against individuals insignificant enough to elude them, and therefore the larger body, the nation, is hit and wounded by them. Neither is there any defence open to us. We send abroad gigantic stories of huge antediluvian lizards, "larger than the largest size;" and we ourselves are kept upon the stare at our own wonders, from Georgia to Maine, until we find out we have been exulting over the stranded remains of a common spermaceti whale. At this present moment, a huge animal, dug out of the Big-bone-lick, sixty feet long, and twenty-five feet high, is parading through the columns of the European newspapers, after making its progress through our own. This is, what every naturalist supposed it to be, also a great imposition. Within these few days, too, a piece of one of our common coal plants, has been, with great note of preparation, conjured into a petrified rattle-snake. All these jibes and reproaches we ought to have been spared. There ought to have been the ready means amongst us, together with the independence and intelligence, to put down these impostures and puerilities as they arose.

It is for this object, as well as for the diffusion of the love of science at home, that this monthly journal is about to be established. Without any previous promise of patronage, it is offered to a numerous and intelligent community, and will seek to win its way to favour, by the industry, accuracy, and fair dealing of its editor, and by the enlightened philosophic spirit, unacquainted with pedantry, of the minds that will preside over it. If it should fail of success, the editor will always be able to make an honourable retreat, and not before he will have done some good. But of this he is not afraid. Sustained by the gifted friends who will come to his aid, both from Europe and from this country, the proofs of which he soon hopes to submit to the public, he enters upon the undertaking with cheerful confidence. He sees in the now restrained talents and knowledge around him, and in the ample domain of American nature, materials, that only wait to be touched, to start into life: and it is upon those talents he will call, and upon the public at large, to assist him

to vindicate the natural history of America, and the reputation of American naturalists.

It is proposed to issue one number of this work monthly; each number to consist of fifty pages, with appropriate figures and illustrations, got up in an instructive and artist like manner.

Each number will contain a continuous *Essay on Geology* as a science, treated in an elementary manner, divested of all technicalities; so that the great principles, from which philosophical views of the arrangements and operations of nature are drawn, may be lucidly brought forward.

The various branches of Natural History, *Zoology*, *Botany*, *Mineralogy*, *Meteorology*, and the nature and forces of all *physical natural agents*, will be treated of and illustrated in a familiar and instructive manner.

Comparative Anatomy, together with the habits and propensities of animals; also the phenomena attending vegetable nature, especially American nature, whether fossil or recent, will be liberally discussed in the pages of this journal.

It is the intention of the editor to insert occasional papers on the aboriginal antiquities of this country, and on the structure of the Indian languages. All communications which aim at illustrating the physical and moral progress of our own species, will be favourably received.

The state of trans-atlantic natural science will be reviewed in each number. All new discoveries, and able examinations of their bearing upon natural science, will be noticed. *Chemistry* will be included as applied to all changes in nature.

Critical reviews and examinations of works on natural history will occasionally appear. Upon all these important subjects, approved original papers from correspondents, bearing the stamp of good sense, will be published on convenient occasions, leaving the writer responsible for facts and opinions.

It being intended to make this work accessible to the greatest number of readers, with a view to the most extensive diffusion of the knowledge of nature, it will be issued at an expense to the public, as low as the experiment can possibly be made with reasonable hopes of continuing the work.—The price, therefore, for about six hundred pages annually, with at least twelve octavo plates, illustrating a great variety of objects, is limited to $3 50 yearly.

As it is indispensable to the support and continuance of this work, that the proprietor be not exposed to the losses and delays attending the collection of so small a sum, it will be required to be paid on subscription, and will not be furnished without.

All scientific communications, post-paid, to be addressed, "*To the Editor of the Monthly American Journal of Geology and Natural Science, Philadelphia.*"

Communications on business to be addressed to "*Henry H. Porter*, proprietor of the *Literary Rooms, &c.* 121 Chesnut street, *Philadelphia.*"

The work will be conducted by G. W. Featherstonhaugh, Esq. Fellow of the Geological Society of London, Member of the American Philosophical Society, &c. &c.

John Mardon, Bookseller, No. 30, Jewin Crescent, Jewin street, Aldersgate, London, England, Agent.

Philadelphia, May 20th, 1831.

INTRODUCTION.

We are pledged in the Prospectus, to give in each number "a continuous *Essay on Geology* as a science, treated in an elementary manner, divested of all technicalities: so that the great principles, from which philosophical views of the arrangements and operations of nature are drawn, may be lucidly brought forward."

A series of such Essays, carried on, as we love to hope it will be, for a long period of time to come, will comprehend particulars of the highest importance, and form, at length, a work of some magnitude. Moved, therefore, by a desire to open the most ample field for the instruction and amusement of our readers, we propose to begin to redeem that pledge, by drawing up an epitome of the progress of Natural Science. But first we would remark, that there are many persons who have not yet turned their attention to Natural History, and who are still deterred from doing it, by the apparently insurmountable difficulties presented by the multifarious objects in nature, and the technicalities and names, so far apart from the ordinary terms of language. Such persons are agreeably disappointed, when they come to discover how gentle the gradations are between each step in the order of

nature. A nomenclature raised upon artificial systems, and which has not for its basis the general harmony which connects all the parts of creation, is as repulsive, as it is unprofitable; for it disconnects the student from nature, the sole object of his pursuit. Such nomenclatures are becoming unpopular, natural systems are taking their place. The progress of science is uncertain and unsatisfactory, when it is attempted by any other means than practical observations of the affinities of the parts of nature. This is the true basis of all classification. Direct agreements between any two natural objects, form a true nucleus for natural families, which we increase by the accession of other individuals existing under the same conditions. The division of animated nature into two great groupes, vertebral and invertebral, affords great facilities to the student in zoology. Thus, all animals having backbones and skulls, are separated from all those without them, and which are protected by shells, and other external coverings. Here there is an apparent gap in the order of nature. Although we can profitably avail ourselves of the advantage this zoological division affords us in the study of nature, yet it by no means authorizes us to say, that nature has here made a jump from one scheme of structure to another, but rather it becomes us modestly to suppose, that our own observation is at fault, and that this apparent gap will ere long be filled up by the industry and genius of man. Liberal and active minds rejoice most in the contemplation of difficulties of this character; and certainly it is wiser, instead of being astounded at this specious transition, and proceeding to raise systems upon it, to take comfort in it, as hiatus non deflendus. Each of these great divisions contains innumerable objects, and by subdividing them, and classing those together, which have the most marked affinities for each other, we at length come to know all the individuals in nature, by designations drawn from features, which not only separate them from the rest, but which at the same time reflect their true place in nature; as the prismatic rays do for the beam into which they naturally blend themselves. In this manner the Conchologist, the Entomologist, the Botanist, the Mineralogist, acquire without effort the knowledge of several hundreds of thousands of objects in nature. We advise our readers, then, not to be deterred by difficulties which are more apparent than real; and not, on this account, to avert themselves from the great

object of existence, the study of the Creator through his works In the conduct of this periodical, we hope to give proofs that our intention is to make ourselves understood: to treat our subjects in an elementary and perspicuous manner. In short, we propose being useful to our readers, and not to occupy ourselves with making a specious parade of attainments, far short of what it becomes us to possess.

There is another, and a very numerous class of persons, that has been deterred from entering upon the study of natural history, by prejudices conceived against Geology, a science, which has not at all times been fairly treated either by its friends or enemies. Geology, in its most comprehensive sense, denotes the history of nature; for its various phenomena present themselves to the consideration of the naturalist, in relation with all the physical sciences. When geology, therefore, became obnoxious to the suspicion, that it was hostile to revealed religion, the study of its branches, to a certain extent, was looked upon with distrust, as disposing the mind to scepticism, and to the belief, that the parts of nature were independent of their Creator, because they partook of the perfection of all his works. The modern leaders of geology, have, by their industry, learning, and prudence, almost eradicated these groundless opinions.

In the by-gone days of theological zeal, when the majority of zealots almost amounted to unanimity, every writer on geology was supposed bound to confront all the physical phenomena with the *construction* given in a not very enlightened age, to that brief account of the origin of the world, contained in a venerable record devoted to the moral instruction of men. The Theologian said to the Naturalist, "You will find it recorded in the Bible, that the world was created out of nothing, about six thousand years ago, in the space of six days of our modern computed time; and that about four thousand years ago, it was overwhelmed by a deluge of water, which destroyed all living things that did not enter into the ark of Noah. The curious petrifactions you say you find, are the remains of the animals and plants, which lived from the creation to the deluge. This is what you must believe, if you will not run the risk of being driven from society as irreligious and anti-social."

In using the terms "brief account of the origin of the world," in reference to the Mosaic account, it is the *construction* given to

a short passage in that Record, which it is mean to impugn, and not the record itself, in the reverence of which the writer of these pages has been educated. In the ancient patriarchal times, men believed the sun went round the earth, in consequence of the apparent motion of that luminary. It is stated in the Bible, that Joshua commanded the sun to stand still, when he encompassed Gibeon; and that "it stood still, and hasted not to go down a whole day." In recording events of a miraculous character, it is evident the historian spoke in such figures only as could be understood. Had the sacred writer said, that Joshua had commanded the earth to stand still, he would not have been comprehended. The assertion perhaps would have been deemed blasphemous, as contrary to God's laws. Connected with this natural prejudice, the force of education had given an ancient construction to the account in Genesis of the creation of the world, the effect of which has been to put physical and moral truths, apparently at variance with each other. But as truth cannot conflict with itself, we must look for the cause of this discrepancy in human errors.

It is not with a view to state how utterly hopeless it is to look for explanations of physical phenomena in pages consecrated to moral instruction; or how equally hopeless, and reprehensible too, it would be, to rashly look into revelation by the light of geology, that a recurrence to this passage in Genesis, will here be made; but rather to reconcile the theologian to a very simple construction of the passage alluded to, and which is found in the very opening of the Bible. "In the beginning God created the heavens and the earth." Now let the rule of the theologian be applied to this passage, and let it receive a literal construction. We here find the first notice of creation. We do not find it stated that the heavens and the earth were created six thousand years ago, or at any other definite period of past time. It is simply said, "In the beginning," a term, in the contemplation of which, the human mind is lost, amidst feelings of conscious weakness, and inexpressible humility. What that beginning is coeval with, we cannot conceive; we cannot come so near to that Being, to whom all time is but one present existence: but we can conceive painfully, after our human mode of thinking, of the solitary existence to which those would assign the universal Creator during the immeasurable period that preceded the six

thousand years, at the commencement of which they choose to suppose the heavens and the earth were first created. These words, then, cannot mean the beginning of eternity, which has no beginning, nor are they placed there to assert that creation had a beginning, which would be superfluous, since we cannot conceive of an act without a beginning. Without reference, then, to any time whatever, we must regard it as a declaration, that the heavens and the earth were created, and by God, leaving room for no inference that they existed without a maker.

The next verse is still more explicit—"and the earth *was* without form and void." Here is a declaration that the earth *was;* that its creation had been effected, antecedently to that period of time usually called the six days of creation. Such we may suppose to have been the geological state of the earth, *void of all living forms*, at the period immediately preceding the establishment of the present order of nature, and which is stated to have been effected in the distribution of the six days' work mentioned in Genesis. Now we find no allusion in the Bible to the geological periods which preceded the restoration of the surface, or to the mineral and organic evidences which we now find, under such various circumstances, in the crust of the earth, and many of which lie at vast depths from the present surface. The inspired historian, had he been competent to the disclosure, would probably have deemed it foreign to the moral purpose he had in view, and would have preferred leaving such discoveries to the restless inquiries of man, always seeking to enlarge the boundaries of knowledge, and destined to construct, out of geological phenomena, one of the strongest bulwarks of natural theology.

It is evident, that it was not a principal object in the narrative of the Jewish cosmogony, to make such allusions, or to treat the physical subjects spoken of with any particular accuracy. The evenings and the mornings of the first, second, and third days are enumerated, before the creation of the sun is mentioned; and yet *evening and morning* can correspond to no portions of time, save those fixed by the setting and rising of the sun. It is on the fourth day only, the creation of the sun is mentioned. From these considerations, it may be reasonably maintained, that the account of the creation, in Genesis, concerns only the present order

of nature, and is by no means involved with the ancient geological periods that precede all records. Under the influence of a spirit of mutual candour, we see here a common ground for the Theologian and Geologist to stand comfortably upon. One which brings prejudice neither to religion nor science, and which admits of our mutually co-operating to eradicate entirely the ancient errors, that our small planet was the sole motive of universal creation, that it is the centre of the universe, that the sun rolls round it, and that no part of it existed more than six thousand years ago. The greater part of this mass of error has indeed been in modern times, isolated and extirpated, but its influence still exists, in that most erroneous opinion which substitutes for the creation of the earth, the renovation of its surface.

It results from this method of considering the subject, that our planet is immeasurably more ancient, than the period assigned for its age, by the chronological constructions that have obtained so long, and that this immense antiquity is by no means at variance with the account in Genesis.

We shall close this first part of the duty we have imposed upon ourselves with these remarks. In our next number we propose entering upon an epitome of the rise and progress of natural science. At our opening of this great subject, we have been anxious to point out, what, in our opinion, have hitherto constituted material objections to the study of natural history. The first objection, connected with nomenclature and technicalities, it will be our duty to obviate; and we shall study to make our various subjects both instructive and agreeable, by explaining nature in such language as may befit the simplicity of her own operations. And in relation to the other point, we have no intention, and think we run no risk, of wounding the tenderest conscience. Our own opinions have long gravitated to a point far short of the extremes of bigotry and scepticism. Experience has made us indifferent to all theories which cannot be sustained by admitted facts, and a steady advance from the known to the unknown.

About to be booked in the mail for a long journey with our readers, over a country we are familiar with, we shall upon all occasions, endeavour to communicate what we know, in an unpretending and friendly manner. We shall not entirely rely upon the ducks, the geese, and the hay-stacks to be seen on the road, for conversation. And when we part, and our readers continue

their travels without us, we are not without hopes that some of them will kindly say of us, that we were a useful and pleasant travelling companion. EDITOR.

RHINOCEROIDES ALLEGHANIENSIS.

Extract of a letter addressed to the Rev. Dr. Buckland, Oxford, containing a description of a fossil fragment of the jaw of an extinct animal, forming a new genus of the order Pachydermata, and provisionally named *Rhinoceroides Alleghaniensis.*—Vide Plate I.

"IN a former communication to Roderick J. Murchison, Esq., which was read before the Geological Society, the 2d January, 1829, I observed, that no trace of the Rhinoceros had been yet discovered on this continent.

"About fourteen months ago, I was so fortunate as to come into the possession* of a fossil having some very peculiar characters. I communicated to some friends at the time, that I had strong grounds to believe in the ancient existence here, of an animal approximating to the genus Rhinoceros. The anomalous character of this fossil, which consists of part of a jaw and two teeth, in fine preservation, made me hesitate about the publication of it. After much deliberation, I have at this time great confidence that there is no fallacy to be apprehended, and therefore I transmit a very excellent cast of the fossil to you, requesting you to present it, together with this communication, to the Geological Society, in my name. The cast being a composition of wax and lime, has shrunk in length half an inch, and otherwise in proportion. I shall, as soon as it is finished, transmit an engraving of the fossil, having the proper proportions.

"The mineral composition of this fragment, gives it a very anomalous character, and is a circumstance entitled to the particular consideration of geologists. There is nothing of the nature of bone about it, except the form: the whole substance, the teeth included, being constituted of an aggregate of small quartzose particles; and presenting the appearance, not of a gradual substitution by mineral infiltration, to osseous matter, but of a cast of part of a jaw and teeth, formed of small quartzose grit, and giv-

* By the kindness of my friend Benjamin Wright, Esq. He received it from Robert Fulton, Esq., who has obligingly furnished me the details of the locality where he obtained it.

ing a semi-translucency to the teeth, which is wanting to the more opaque jaw. These circumstances are somewhat imitated in the cast.

"It was found about three feet from the surface, lying immediately beneath the roots of an oak tree, 24 inches in diameter, which had been blown down, and was entirely rotten. The soil from which it was dug, was the common superficial soil, or diluvium of the country, as it is represented to me. I hope to visit the place this summer, and shall then have an opportunity of ascertaining whether the soil is alluvial or diluvial. Being found on the Castleman river, it may probably be the first—for I am not yet in possession of authentic evidence, that any organic remains of terrestrial quadrupeds, have been found in this country, in that deposit we are accustomed to call diluvium. The locality is in Somerset county, Pennsylvania, on Castleman's river, about 13 miles above the village of Turkey-foot. The superficial soil reposes on the mill-stone grit and shale, which is there superincumbent on the carboniferous lime-stone. There is much bituminous coal in that region.

"Dr. Harlan, of this city, an experienced comparative anatomist, was kind enough to take the comparative dimensions between this fossil, and the corresponding jaw of a rhinoceros indicus; a skeleton of which animal, lately imported from India, has been admirably set up by him, in the hall of the Academy of Natural Sciences, in this city. Those dimensions, which I now add, have been since verified by myself.

DESCRIPTION OF A FOSSIL FRAGMENT OF A JAW, WITH TWO INCISORS.

Comparative dimensions between it and the corresponding Jaw of the Rhinoceros Indicus, of Cuvier.

RHINOCEROS INDICUS, CUVIER.			FOSSIL FRAGMENT.	
	Inch.	10ths.	Inch.	10ths.
Length of the right intermaxillary bone, inferior border, on a level with the alveolar process,	3	0	2	6
Length of the superior border,	4		3	1
Greatest height of intermaxillary bone,	2		2	
Greatest thickness,	1	3	1	3
Distance from the intermaxillary suture, to the place of the first molar,	2	5	5	

	Inch.	10ths.	Inch.	10ths
Shortest diameter in height of the superior maxillary bone, anterior to the molars,	2		1	7
Length of the single incisor,	2	3		
Do. of the 2 incisors,			2	3
Height of the same,		7		8
Distance from the anterior extremity of bone, to the curve upwards, to form the anterior nares,	6		5	5
Length of the cutting edge of the anterior incisor of fossil,			1	2
Do. do. of the posterior do. do.			1	1
Total length of the fossil fragment,			7	6

"I find nothing in the works of Baron Cuvier, or any other naturalist, which indicates any knowledge of this animal in Europe; and it is, as far as I am apprised, the first specimen of the kind discovered in America. Notwithstanding the affinity, which the agreement of these comparative dimensions appears to establish between it and the genus rhinoceros, still, the great space between the intermaxillary suture, (very distinct in the fossil,) and the place of the first molar, being in the fossil twice as much as in the recent R. Indicus: also the occupation by two incisors in the fossil, of the space allotted to one incisor in the R. Indicus, are conspicuous characters, which establish it as a new genus of the order Pachydermata.

"I forbear to ground any argument for a great antiquity to this fossil, from its mineral structure; and I leave to more experienced naturalists to determine, whether its period ought to be referred nearer to the Palæotherium, than to the elephant; the last of which animals, has left many remains here.

"Unwilling to designate it by any fanciful or philonymic appellation, and thinking that by some naturalists it may be judged to stand in the same relation to the genus rhinoceros, that the elephant does to the mastodon, I have provisionally named it Rhinoceroides Alleghaniensis, by which appellation I have attempted to convey in the simplest terms, its con-generic relation, and its territorial habitat. I remain, my dear sir, most faithfully yours, G. W. Featherstonhaugh.

Philadelphia, April 3, 1831.

A. *River Niagara*
B. *U. S. Shore*
C. *Upper Canada Shore*
D. *Goat Island*
E. *Horse Shoe Fall*
F. *Schlosser Fall.....* 163 F.t Perpen.t
1072 „ *Wide*
G. *Table Rock. Carboniferous L. 150 F.t Per.*
H. *Ridge of Diluvium 130 F.t above Table R.*
and overlying it
I. *The Rapids on the Cherty Beds of y.e Ca.*
J. *West Brow of Goat Island 158 F.t Perp.*
K. *Width of Brow 1287 F.t*

From Goat Island to Table Rock..... 1221 F.t
Curvature of Horse Shoe Fall..... 2376 „
Width of the River Niagara from the East End of Goat Island..... } ... 5940.

FLAT VIEW OF THE
CATARACT OF NIAGARA.

ON THE ANCIENT DRAINAGE OF NORTH AMERICA, AND THE ORIGIN OF THE CATARACT OF NIAGARA.

By G. W. Featherstonhaugh.

I SHALL in this paper make some general observations upon the ancient drainage of North America, and then apply the operating principle to the history of the origin of the Cataract of Niagara.

Mr. Ure, in his new system of Geology, when discussing the influence which streams have had upon their beds, observes, (page 356,) "Historical documents all concur to prove, that streams possessing the greatest power that can be ascribed to them, have no appreciable erosive action upon the rocks over which they run." If this passage were limited to the influence they have upon the surface of their beds when covered with water, it could not be so easily disproved; but as it seems to include every possible mode by which streams can act upon their beds,—and these are various;—it deserves some consideration. The beds of many rivers of this continent, remain dry during a great portion of the year. The floors shrink and expand, as the weather alternates from moist to dry. Almost all the shales disintegrate, and indeed it may be said of all rocks laid bare, that they gradually yield to the influence of weather. The returning floods bear away the loosened fragments, and thus, in long periods of time, streams come to have a powerful action over their beds, widening their courses, and wearing their beds to great depths. But there are other circumstances, differing from these again, under which streams are constantly acting, and which prove that they exercise a remarkable erosive influence over their beds. These will be adverted to in treating of the origin of the cataract of Niagara.

There are many persons, among the great number who annually visit this magnificent waterfall, who cannot be made to comprehend, that it is a reasonable matter, to suppose the cataract, in ancient times, went over the Queenstown ridge, now near six miles distant from the present falls; and an engineer* of the state of New York, who appears to have had much experience in the surveys of that State, has published a paper in the proceedings of a learned society,† in which he denies that suppo-

* Mr. Geddes. † The Albany Institute.

sition, and supposes the ravine between Queenstown and the falls through which the river Niagara flows, to be a natural gorge. I shall in this paper attempt to settle this question upon strict geological principles, and in a manner consistent with those obvious features which the physical geography of the lake country presents.

All our fresh waters are first derived from the atmosphere. If the surface of the earth had been smooth, without any inequalities, rains and floods would have abraded and torn it up. It would have been irregularly furrowed out in the manner we often see fields with a slight inclination. The waters would have been constant to no channel. In the train of consequences involved in such a state of things, we perceive the earth would have been uninhabitable. But it was not ordained so: the earth was intended to be the cheerful home of countless myriads of animals, susceptible of benevolent pleasures. The "dry land" was made to appear. Mountains were raised by subterranean power, and valleys were consequently formed. Instead of some parts of the earth being deluged with rains, and others remaining for years without refreshing showers, we find atmospheric action influenced by those mountains, and the rains drawn down upon their summits and flanks, furrowing out channels down their slopes, to unite themselves hereafter at the lowest levels, where the navigable rivers are found, that have contributed so much to the civilization of man. The accumulation of snow too upon these summits, is an immediate means of the continuity of streams. The inequalities of the earth's surface, form one of the most important features of the economy of nature. The face of the earth is constituted by a series of elevations and depressions. Where the chains of mountains are contiguous, the breadth of the valleys is comparatively small. In many instances, such valleys had their present terminations anciently obstructed, and at such time contained bodies of water. It is an interesting study for young Geologists to detect these ancient lakes, and find out the points where the waters have been able to discharge themselves. Where the chains of mountains lie at great distances from each other, the intervening country is to be considered as a vast valley or basin, the great rivers flowing through the lowest levels, and their tributaries joining them from the more elevated terraces of the basin. It is by this admirable

adaptation of causes, that continents are drained, so many great purposes answered, and the whole volume of atmospheric waters finally returned to the ocean, whence it is again drawn up into the atmosphere, to be again and again distributed upon the earth, for its fertilization.

In seeking the lowest levels, the great rivers frequently embrace in their course, depressions or basins that do not conform to their mean breadth. These larger bodies of water, when spreading themselves far beyond such mean breadth, are usually called lakes. Others, from their extent, are well entitled to be called "inland seas." The origin of such lakes is various, and will not be considered at this time. Of the lake of Geneva, however, which forms part of the course of the Rhone, it may be remarked, that there are geological considerations belonging to it, which suggest, that in ancient periods, the vast basin in which its waters now rest, did not exist; and that it is not improbable an inclined solid plane existed between the Alps and the Jura. The small lakes of St. Francois, St. Louis, &c. on the St. Lawrence, are instances of this widening of rivers into basins. Lake Superior, and the great body of water constituting lake Michigan and lake Huron, belong to the class that might be called inland seas.

In that very useful and popular volume, "Darby's view of the United States," the author has had to struggle,—and not very successfully occasionally—through some interesting branches of a subject, he has, upon the whole, treated in an able manner. The language he holds, at page 65, of the mountains of the Appalachian system, being specifically and generally distinct from the hills, would, if not quite satisfactory, have been less obscure, had he, before venturing on a work of such importance, paid proper attention to a science, the value of which does not apparently rank very high in his estimation. Considering that his work was published in 1828, this is very surprising. In the preface we find the following passage. "Geology, as it stands in our books, being a science, (if it deserves the name of a science,) of conjecture, I have rejected, as far as practicable, terms that teach nothing definite." What books are here referred to, Mr. Darby has not stated; but this may be most truly said, that books were extant before 1828, the study of which would have enabled him to define, in a very precise manner, the particulars upon which every branch of physical geography depends, and

especially, above all the rest, a system for mountain ranges. No man can reason luminously about the origin of mountains, or concerning their specific or generic character, to use Mr. Darby's terms, who is not a competent practical geologist. This important branch of American geology, remains yet to be judiciously treated of.

In this paper, the leading features only of this branch will be adverted to. A great portion of this continent is occupied by a central basin, the walls of which are constituted by ranges of mountains lying at great distances from each other. Long's Peak, is 15,000 feet high; this is the greatest known elevation of the Chippewayan or Rocky mountains. From thence the country slopes eastward. The plains on its east flanks, are about 3000 feet high, being near the medium elevation of the Alleghany mountains, which may be considered the Eastern wall of the basin. At the mouth of the Platte river, we have a reduced elevation of 680 feet above tide water, corresponding to the elevation at Pittsburgh on the west flank of the Alleghanies. At the mouth of the Ohio, where it joins the Mississippi, the depression of the basin, is only equal to 300 feet above tide water. The central line of drainage of this great basin, is occupied by the Mississippi, which receives from its northern and eastern slopes, the Wisconsan, the Illinois, the Ohio, &c. The longest line of drainage is occupied by the Missouri, north and west of the Mississippi, and receives from its western slope, until it joins the Mississippi, the Muddy, the Yellow Stone, and the Platte rivers, and afterwards the Arkansa and its tributaries, the Red river, &c. In about 50° N. lat. another chain of high lands,* connected with the Chippewayan mountains, begins, and runs N. E. between lake Winnipec, and the great Slave lake, of which region it is the water shed. South of this chain, the mean elevation of its table land is about 1200 feet. This chain, which is probably connected with the highlands running north of lakes Superior, Huron, &c. may be regarded as the ancient northern wall of the great basin now described. The table land is full of lakes, many of which have no connection with each other, except in the rainy season, when the Assinaboin and Red river of Hudson's bay, which run north, are said to mingle their waters occasionally with those of St. Peters, which flow southward

* Accurate details of this region are much wanted.

into the Mississippi. The south-east slope of this table land, furnishes the great eastern line of drainage of this continent. At some remote geological period, it is evident all the parts of this basin have been under water, which has subsequently retreated to the ocean; leaving behind those subordinate basins or inland seas now called lake Superior, lake Michigan, lake Huron, lake Erie, and lake Ontario, which are the true heads of the line of drainage by the St. Lawrence. Lake Superior is 595 feet above tide water. Lakes Michigan and Huron, which constitute one body of water, are 571 feet above tide water; whilst lake Erie is 565 feet, and lake Ontario only 231 feet. Thus whilst in the distance between Rainy lake, and lake Superior, consisting of 150 miles, we have a superficial depression of 505 feet, in the short distance of 25 miles between lake Erie and lake Ontario, we have a depression of 334 feet.

West of this depression, the conformity of level is such, that part of the waters of the great eastern line of drainage before spoken of, pass, in the rainy seasons, from their proper line, into the tributaries that feed the Mississippi. Boats have occasionally passed from South Michigan into the Illinois river: the difference of level between lake Huron and lake Erie may be rated as not exceeding 10 feet.

Such are the principal lines of drainage of this continent, all of which are well illustrated in Mr. Tanner's recent maps. But we are yet in want of many levels and projections of chains of mountains, to assist us in detecting the various basins where the waters have been held up, and the slopes and gorges by which they have issued. The immense boulders of primitive rocks, so profusely scattered over the face of this continent, attest alike the partial destruction of their ancient barriers, and the violence of the torrents which have borne them to such great distances. There is not one of the inland lakes, all of which may be considered as subordinate basins to the great American basin before spoken of, but furnishes the proof of a gradual subsidence of level. The ridges south of lake Erie, and from which the lake is now distant more than five miles, clearly attest that the lake at some period has washed their base, and discharged its waters into the tributaries of the Mississippi. In like manner we find evidences of a change of level in the waters of lake Ontario, in the existence of the ridge on the south shore, now several miles

distant from the water; the corresponding banks of which are found on the north side of the lake, at great distances from the water, and extending far eastward into Canada. It was only when the waters began to contract themselves into lower levels, and when Ontario found an outlet by the St. Lawrence, that its ancient banks were abandoned, and the waters of Erie began to flow over the ridge which was continuous between Queenstown and the opposite shore of Lewistown.

In ancient times, when the whole country was under water, and Ontario and Erie were on a level, the cataract of Niagara did not exist: but when the general subsidence of waters took place, when Erie fell below the level of the Illinois, and Ontario below the level of the Queenstown ridge, the waters of Erie would of course take a direction to join the great eastern line of drainage. This we see they have done, and the following details will show the exact difference of level now existing between Erie and Ontario. It will be remembered that lake Erie is 565 feet above the level of tide water, and lake Ontario 231 feet. Although the levels heretofore enumerated in this paper, are to be considered as approximations made by intelligent travellers, and only in a few instances—from the necessities of the case—the result of accurate admeasurement; yet those hereafter to be spoken of, are accurate admeasurements, and entitled to confidence. Those explanatory of the cataract of Niagara and its environs, were carefully made by Mr. George Catlin, a very ingenious artist, for the purpose of constructing a model of the falls of Niagara upon scale, which was executed in a very admirable manner; and from which the flat view of the cataract, appended to this paper, was taken.

The distance from lake Erie to lake Ontario, is about $36\frac{1}{2}$ miles. The particulars of the fall of water in this distance, are shown in the following table:

	Feet.	Miles.
Fall from lake Erie to the rapids of the cataract of Niagara,	15	23
Fall in the rapids to the edge of the cataract,	51	$\frac{1}{2}$
The Horse-shoe fall,	150	
From the Horse-shoe fall to Lewistown,	104	13
From Lewistown to lake Ontario	2	
	322	$36\frac{1}{2}$

The Queenstown ridge, which crosses the line of the Niagara river about six miles south of lake Ontario, is a little to the west of Queenstown, about 347 feet above the level of lake Ontario, and consists of the lower limestone shale of British geologists; having the carboniferous limestone superincumbent upon it, and the common diluvium or superficial soil of the country resting upon this last. In travelling up the gorge from Queenstown to the cataract, where the bed of the Niagara flows, this geological arrangement is constant, and at the cataract we find the shale 80 feet thick, and the carboniferous limestone lying upon it, 70 feet thick to the edge of the cataract. Higher up the stream, other beds of the carboniferous limestone appear, containing seams and patches of dark-coloured chert, which have furnished the name of Black Rock to a village at the mouth of lake Erie. This formation constitutes the floor of that lake, and may be said to extend through the whole western country.

At the general subsidence of the waters, before spoken of, it is evident that when the level of Ontario fell below the summit of the Queenstown ridge, the western waters would follow them, seeking the great east line of drainage. Here then we find the origin of the falls of Niagara, which would have their perpendicular height increased with the progressive subsidence of the waters of Ontario. These waters would soon clear themselves a passage through the superficial diluvium, and the manner in which the whole gorge has been excavated from Queenstown, to the point now occupied by the cataract, is attested by what we observe going on in our own day. The loose friable shale is loosened and washed out by the re-action of the fallen waters, and the superincumbent limestone losing its only support, yields to the weight of the water, and falls into the gorge. The well known Table Rock is an instance of this. The shale has been completely washed out from beneath it, and great portions of it have fallen, as other parts belonging to the edge of the cataract are constantly doing. It is also particularly deserving of notice, that the limestone beds immediately above the shale, are much thinner at the opening of the gorge, and the rock less capable of resisting attrition, than the superior beds which are so well compacted with the chert, and which the cataract is only now approaching. That the greatest portion of the rock which has hitherto fallen, has been comminuted, and washed away by the stream, as the

whole of the shale has been, appears not unreasonable, and may account for the absence of a great portion of the fragments. There is scarce a single circumstance connected with this majestic cataract, which does not assist in the explanation of its retrocession.

As to the period which has elapsed since the waters first began to open the gorge, it is difficult to open a plausible ground upon which a reasonable calculation could be made; but there is one circumstance connected with them, which marks a difference of progress, at certain points of their retrocession. The distance from Queenstown to the falls, is between six and seven miles by the line of the gorge, the average breadth of which on approaching the falls, is about 1200 feet. By a reference to the plan,* it will appear, that up to the period when the waters which fall on the American side, first divided Goat Island from the main land, the whole force of the river Niagara, was exerted in one volume, upon a surface of 1200 feet in extent, forming the width of the gorge. Since that time the operative power of the water, has spread itself over a greater surface; for the stream on the American side, is 1072 feet wide, and the curvature of the great Horse Shoe fall 2376 feet wide, making a surface of 3448 feet long, being near three times the extent of the line it previously exerted itself upon.

This diminished exertion would necessarily be attended by a retardation in the retrocession of the cataract. There is also another circumstance which at present adds to this cause of retardation. The Horse Shoe fall has reached a point, where the limestone beds begin to thicken, and the foam of the rapids,† marks the presence of the terraces of cherty layers, which are here found superincumbent, and giving additional strength and durability to the limestone strata. I might offer as evidence of the very prolonged projection of the waters at this point, the deep basin in the bed of the river, immediately at the foot of the falls, which does not occur in the narrower parts of the gorge, and which has been hitherto unaccounted for.

It has often been proposed to mark in some well regulated manner, the future disintegration of the bed of this cataract,

* Vide plate 2d.

† On the British side where the current is most rapid, the bed of the river is 13 feet lower than on the American side.

with a view to compute the period of its age.* If I have not misconceived the operation of this river, it will now be seen that the elements of this problem are too complicated and vague, to offer any hopes of a satisfactory solution. Under the view I have taken of it, its future retrocession will be very slow. Time, however, will last longer than the carboniferous limestone can probably resist such influences as it has already yielded to. When the cataract shall reach lake Erie, geology will possess one great monument of the power of water to excavate gorges of great length and height.

THE DIARY OF A NATURALIST.

Or Memoranda of the weather; arrival of birds; flowering of plants, &c. for the spring of the year 1830. Kept at the "Bartram Botanic Garden," on the right bank of the river Schuylkill, below the city of Philadelphia. By John B. Carr.

TO THE EDITOR OF THE MONTHLY AMERICAN JOURNAL.

Dear Sir—I send you for publication "The Diary of a Naturalist," kept at my particular request, during the spring of 1830. If the *observations* are not so complete as the interest of the subject might imply, it must be recollected that the author seldom extended them beyond the immediate sphere of his daily occupations.—Having the most perfect reliance on the ability and talents of Mr. Carr for pursuits of this nature, I have perused the "*Diary*" with much satisfaction, and cannot doubt that the subject which it embraces will be viewed with similar interest by yourself and readers.—I have the honour to be most respectfully, &c. R. HARLAN.

March 1. Wind, a strong north-east, with snow and rain. Large flights of robins, (TURDUS *migratorius*,) feeding on the red-

* Mr. Lyell, in his principles of Geology, (Vol. I. p. 181,) has,—supposing that the disintegrating power of the volume of the Niagara river, will at all times be equal, at every point of its course—ventured on a computation, that, at the rate of fifty yards in forty years, lake Erie will be reached in the course of thirty thousand years. That the recession of these falls is effected as Mr. Lyell supposes, we have never doubted; but a long and familiar acquaintance with the cataract, has induced us to adopt the opinion we have just seen announced by the Rev. W. D. Conybeare, (Annals of Philosophy, No. 52. April, 1831. Page 267,) that in forming the first estimates of this computation "some partial degradation of the strata has here been mistaken for the general retrogradation."

cedar berries, (JUNIPERUS *virginiana*,) in the vicinity of the garden. —A small flock of cow-birds, (EMBERIZA *pecoris*,) were observed feeding in the woods, with many blue-birds, (MOTACILLA *sialis*,) which have probably been deceived by the mild weather of the last week of February.—Spring, or winter aconite, (ERANTHIS *hyemalis, vel* HELEBORUS *hyemalis*,) snow-drop, (GALANTHUS *nivalis*,) hearts'-ease, (VIOLA *tricolor*,) and skunk cabbage, (POTHOS *fœtida*,) in flower. In the hot-house we have a fine AMARYLLIS in flower, from Rio de Janeiro. This afternoon two vessels sailed up the Schuylkill, the first this season.

2. Snow has fallen all night, and this morning is three inches deep—continuing to snow all day, and at sunset is eight or ten inches deep—wind NE. moderate—at 8. P. M. clear and freezing.

3. Fine sleighing in the morning, but commencing to thaw in the middle of the day—in the evening the sleighs were going through the mud—wind NE.—at sunset clear and cold, wind SW.

4. A fine March morning; the winter wren, (MOTACILLA *troglodytes*,) crested titmouse, (PARUS *bicolor*,) and black capped titmouse, (PARUS *atricapillus*,) are singing about the house as merry as crickets. The flowers are several inches under the snow yet —wind NE., and freezing.

5. A fine thawing day. Wind SW.—Thermometer 54° at 3 P. M. During the morning the jay-birds, (CORVUS *cristatus*,) kildeer plover, (CHARADRIUS *vociferus*,) and flicker, (PICUS *auratus*,) were observed—snow beginning to disappear.

6. Rained until noon—3 P. M. thermometer at 50°—in the afternoon very foggy—blue-jays and large flocks of meadow larks, (ALAUDA *magna*,) are flying about—wind SW.

7. Morning warm and drizzling—very foggy—blue-jays, winter wrens, blue-birds, kildeers, crested titmouse, &c. about the house. In the morning there was a shower of rain from the W. with thunder in the distance. Lightning in the SSE.—wind brisk from the SSW.

8. A clear warm morning: about 10 A. M. wind changed to NW.—weather colder—saw a flock of wild pigeons (COLUMBA *migratoria*,) and cow-buntings. Began freezing about 5 P. M.

9. Ice this morning an inch in thickness. Clear and cool, wind NW., moderate. In the middle of the day thawing in the sun—crow blackbirds, (GRACULA *quiscala*,) are seen about the house, very tame—freezing in the evening—wind WSW.

10. Fine moderate day—wind SW.—at 3 P. M. thermometer 44° in the shade. Robins are observed flying about. This morning commenced work in the garden.

11. Warm and hazy—8 A. M. thermometer 40°—wind SSW. rather brisk—clouded at 11 o'clock with every appearance of rain—evening foggy, wind N. and cool—large flocks of red-winged black-birds, (STURNUS *predatorius*,) passing to the north, and large numbers of ducks in the Schuylkill. The snow has not entirely disappeared, but I have observed the beautiful early veronica ——— in flower; (this lovely blue flower has puzzled our botanists;) common mouse-ear chick-weed, (CERASTIUM *vulgatum*,) appears as if it had flowered all winter, as there are ripe and half ripe seeds, and flowers on the same plant at present.

12. Warm and clear—wind SW.—thermometer at noon 47°.

13. Morning cloudy—thermometer 38°—at 10 A. M. cleared up warm—wind SW., very strong.—Frost flower, (DRABA *verna vel* EROPHILA *vulgaris*,) in bloom—wild geese, (ANAS *canadensis*,) passing to the north—evening cloudy.

14. Fine spring morning—large flocks of red-winged black-birds and crow black-birds flying toward the north—wind brisk from NW.—thermometer at noon 48°.

15. Warm and clear, wind NW.—planted peas, potatoes, &c. this day.

16. Cloudy and cool—wind NE.—thermometer in the morning 34°—at noon 40°—primroses, (PRIMULA *vulgaris*,) in flower in the open border.

17. Rain, and strong NE. wind in the morning—SW. in the afternoon—NW. in the evening. Rained all day—the pewits, (MUSCICAPA *nunciola*,) have arrived.

18. Rain continues—wind SW.—about 10 A. M. shifted to NW.—Filberts and hazlenuts, (CORYLUS,) in flower.

19. A fine lively morning—a little ice and frost—wind NE.—thermometer at 10 A. M. 45°—3 P. M. 54°—wind NNW. Last evening the spring frogs, (RANA *flavi-viridis*,) were heard for the first time this season. In the evening a fine light breeze from the west.

20. Fine morning—wind SW.—thermometer at 9 o'clock A.M. 45°—at 3 P. M. 54°—evening 50°.— Flickers singing.

21. Drizzling in the morning—wind SW.—thermometer at 9, 3, and 5 o'clock, 53°, 60°, and 54°. Shad frogs, (RANA *halecina*,)

and leopard frogs, (RANA *palustris*,) have made their appearance —a pair of winter wrens are building their nest in one of the green houses—song sparrows, (FRINGILLA *melodia*,) cheer us with their music to-day.

22. Morning clear and warm—large flocks of wild geese flying towards the NE.—11 A. M. distant thunder towards WSW.—commenced raining at 4 P. M.—cleared at sunset.

23. Last night experienced a heavy thunder storm, accompanied with heavy driving rain from WNW.—morning fine—robins singing—wind NW.—afternoon blustering and cool.

24. A slight skim of ice this morning—weather clear and fine —wind NE.

25. Fine day until evening—robins continue their song—commenced snowing toward evening—wind NE.

26. Rain—stormy wind from NE.—large flights of wild pigeons flying toward the south—the whole township up in arms shooting at them.

27. A fine moderate day—wind SW. Henbit or archangel, (LAMIUM *amplexicaule*,) in flower.

28. Morning clear, with a blustering wind from the NW.—afternoon fine weather—thermometer at 3 P. M. 54°.

29. Warm and slightly hazy—wind NE.—kingfisher (ALCEDO *alcyon*,) flying about—red owl, (STRIX *asio*,) hooting—blue-flowered houstonia, (HOUSTONIA *cærulea*,) in flower.

30. Weather fine and warm—*Claytonia Virginica*, and speedwell, (VERONICA *arvensis*,) in flower.

31. Raining nearly all day—wind NE.—in the afternoon changed to NW. and cleared about sunset.

April 1. A fine day—wind SW.—apricots in bloom—peaches nearly open—shad fishing has commenced in Schuylkill—at 8 P. M. raining.

2. Continued raining all day—martens, (HIRUNDO *purpurea*,) have arrived from the south.

3. Weather fine and clear—wind SW.—Dutchman's breeches, (CORYDALIS *cucullaria*, *vel* DICLYTRA *cucullaria*,) in flower—pewits beginning to build their nests.

4. Fine weather continues—wind SW. Colts-foot, (TUSSILAGO *ptasites*,) witch hazle, (HAMMAMELIS *virginica*,) weeping willow, (SALIX *babylonica*,) and cornelian cherry, (CORNUS *mascula*,) in flower.

5 & 6. Clear and warm—wind SW.

7. Clear and cool—wind N.—red-headed wood-peckers, (PICUS *erythrocephalus*,) are seen about the garden.

8. Clear and pleasant—wind SW.—apricots, peaches, red maple, (ACER *rubrum*,) hazlenut, primroses, narcissus, jonquils, &c. in flower.

9. Morning cloudy, with every appearance of rain—wind NE. —clear at noon—ground ivy, (GLECHOMA *hederacea*,) and puccoon, or Indian paint, (SANGUINARIA *canadensis*,) in flower

10. A NE. drizzling wind has continued all day.

11. A fine clear day—wind ESE. and S.—spice wood, (LAURUS *benzoin*,) Lombardy poplar, (POPULUS *dilatata*,) and skunk cabbage in flower—the little sparrows (FRINGILLA *socialis*,) are plenty now.

12. Clear and warm—wind SW.

13. Fine weather continues—wind NE. Barn swallows, (HIRUNDO *americanus*,) and purple martins are now plenty.

14. A cold, disagreeable day—wind NE.—afternoon showery.

15. The finest day we have enjoyed this spring—CALTHA *palustris*, TRILLIUM *sessile*, TRILLIUM *grandiflorum*, JEFFERSONIA *diphylla*, ANDROMEDA *calyculata*, and service-tree, (PYRUS *botryapium*,) in flower.

16. Fine weather continues—wind NE.

17. Warm and pleasant—in the afternoon wind SW.

18. Warm and cloudy—wind NE.—at 10 A. M. cleared up.

19. Morning and part of the afternoon clear and fine—in the evening cloudy, with the wind NW.

20. Morning disagreeably cool, with white frost—afternoon fine weather—hyacinths in full bloom.

21. Clear and warm—goldfinches, (FRINGILLA *tristis*,) have arrived.

22. Fine weather continues—chimney birds (HIRUNDO *pelasgia*,) and house wren, (MOTACILLA *domestica*,) have arrived—cow buntings are pairing.

23. Very warm—the plants suffer much from the prevailing drought—wind SW.—red bud, (CERCIS *canadensis*,) and European horse chestnut, (ÆSCULUS *hippocastanum*,) in flower—wood-robin, (TURDUS *melodius*,) chewink, or tohee-bunting, (EMBERIZA *erythropthalma*,) and summer yellow-bird, (SYLVIA *citronella*,) have arrived.

24. Clear and dry—wind SW. and W.

25. Very foggy and warm—wind E. and ENE. and variable.

26. A very acceptable rain which terminates the 11 days drought.

27. A smart frost last night—ice was formed from the condensed vapours of the green house—wind NW.

28. Clear and warm—wind SW.—CERASTIUM *tenuifolium*, STELLARIA *pubera*, tulips, horse-chestnuts, magnolias, double-flowering cherries, sweet scented shrubs, (CALYCANTHUS *floridus*,) and lilac, (SYRINGA *vulgaris*,) in full bloom.

29. Morning cool and cloudy—afternoon fine and warm—wind SW. Made a visit to New Jersey—observed the SILENE *pennsylvanica*, EUPHORBIA *ipecacuanha*, ARABIS *lyrata*, ANTIRRHINUM *canadense*, HELONIAS *latifolia*, &c. in flower. The night-hawk, (CAPRIMULGUS *americanus*,) was noticed.

30. Clear—pleasant SW. wind. The whole garden appears animated with birds—orioles, sparrows, fly-catchers, warblers, thrushes, humming birds, (TROCHILUS *colubris*,) &c. are seen in every direction.

May 1. Clear and fine—wind SW. The shad fishing recommenced this morning, having been suppressed since Monday, April 26, on account of the freshet.—Birds as plenty as yesterday—garden overrun with visiters.

2. Fine weather continues—wind SW.

3. Morning warm, with showers—afternoon steady rain—wind SE. and NE.

4. Clear and warm—wind SW.—seeds of the white maple (ACER *dasycarpum*,) ripe and shedding.

5. Clear and warm—reed birds (EMBERIZA *oryzevora*, now ICTERUS *agripennis*,) have made their appearance—night-hawks are observed flying about, and the whip-poor-will (CAPRIMULGUS *vociferus*,) was heard during the evening.

6. Fine and warm—removed the plants from the green house to-day—STELLARIA *pubera*, SPIREAS, and VIBURNUMS in bloom.

7. Morning cool—slight frost—wind NW.

8. Clear and warm—wind SW.

9. Weather pleasant—wind NE. and SW.

10. Fine weather continues—yellow breasted chat, (GARRULUS *australis*,) singing.

11. Warm and dry—wind SW.—night-hawks setting.

12. Morning cool—a few humming birds were shot to-day. These birds are not so plenty this year, as they were last season.

13. Morning drizzling—wind NE. light—afternoon cloudy but no rain.

14. Light rain in the morning—afternoon clear.

15. Clear and warm—wind SW.

16. Clear and warm—rode up to the gulf mills, about 17 miles NW. of Philadelphia, and observed some plants of ginseng, (PANAX *quinquefolia*,) and GERARDIA *quercifolia* growing near the road. Caught a rare species of *scarabæus*.

17. Morning foggy—remainder of the day clear and warm.

18—21. Warm and clear—southerly winds prevail.

22. Warm and clear—evening cloudy, with every appearance of rain—wind SE.

23. Cloudy—commenced raining at 2 P. M. and continued until evening.

24. Clear and warm—occupied in preparing plants, rare flowers, fruits, &c. for the *Horticultural* exhibition, to be held by the society in Philadelphia, on the 25th and 26th.

25. Cool and cloudy in the morning—wind NE. brisk.

26. Warm and clear.

27. Clear and warm—brought the plants home from the exhibition uninjured.

28. Fine weather continues—the humming birds are building their nests.

29. Very warm—wind SW.

30. Drizzling all day—wind ESE.

31. Clear and warm—wind SW.

June 1. Morning cloudy, and drizzling—the *humming birds* have commenced incubation.

2 and 3. Clear and warm—wind SW.

4. Rain—wind NE.

5. Clear and pleasant—a few of the periodical or 17 years locust (CICADA) singing.

6. Rain—wind NE.

7. Clear and warm.—Summer has commenced.

ON NOMENCLATURE.

We are glad when French naturalists attack the false nomenclatures that spring up on this side the Atlantic. This has been done in the March number, for 1829, of the Bulletin des Sciences Naturelles et de Geologie. No doubt they have had some reason to amuse themselves at our expense; we are not the less afraid on that account, of their giving us credit for some sober views of Natural Science. With few exceptions, the naturalists of this country appear decidedly opposed to conjectural and fantastical speculations, and are averse to seeing science trifled with, in any quarter whatever. But they cannot shut their eyes to the innovations of some of the more conspicuous French writers. It is admitted that natural history is under the deepest obligations to the labours and genius of Cuvier. Every man in France, however, does not possess the sound judgment of that great naturalist. Science is occasionally tricked out in that quarter, with a frippery that disguises it.

The invention of the terms ophiolite, euphotide, phyllade, &c. &c. as substitutes for serpentine, saussurite, slate, &c. &c. is likely to be a failure, as far as it concerns us on this side of the Atlantic. We venture to predict as much for the extraordinary nomenclature proposed in the article "Theorie" in the 54th Vol. of the Dictionnaire des Sciences Naturelles: an article replete with geological learning and acumen, but so endimanché, that we are really ashamed to go into such company with hammers and chissels about us. In this article, all geological phenomena are divided into two periods. The Saturnian, comprehending every thing that occurred before *the last revolution*, (*???*) and the Jovian, comprehending what has occurred since. The superficial soil, or deposits of *diluvium*, as we have been in the habit of calling them, we are now asked to call "*Terrains Clysmiens.*" The upper fresh water, "*Terrains Epilymniques.*" The upper marine "*Terrains Proteiques.*" The London clay "*Terrains Tritoniens.*" The gravel beds of the plastic clay "*Terrains Clastiques.*" The chalk "*Pelagique Cretacés.*"

The old Saxon weald clay is to be again subdued by the Norman French, and to be called "*Mons argile veldienne.*" Kimmeridge clay is christened over again, and is called "*marne argileuse havrienne:*" there being a handful of it at Havre, and a world of it

in England, where it was first recognized and named. Then come the "*Terrains Yzemiens Abyssiens*," the "*Pœcilien*," the "*Psammite*," the "*Hemilysiens*," the "*Agalysiens*," all of which are our old friends in fancy ball-dresses; the *Lias*, the *gypseus red sandstone*, the *old red*, the *transition limestone*, and the *primitive rocks*. The *trap rocks* are "*Terrains Typhoniens*," because the giant Typhon is buried in the earth, and is constantly endeavouring to heave up the crust!!! We give the following passage, as a specimen of this new geological language, and will endeavour to translate it.

"I will content myself then, with saying, that I will place in the *clastic groupe* of the *Tritonian Thalassic beds*, the deposits composed of rounded pebbles, which, by their superior position to the cretaceous beds, cannot be placed in the *clastic* beds of the *pelagic* deposits: and by their position below *palœotherian thalassic* beds, cannot be associated with the *gompholites of the proteique groupe*."

This is the solemn determination come to, in favour of some puddingstone beds, below the London clay of Morlage and other places. We know of nothing equal to it, out of Pinkerton's Petralogy; where *Sidereous*, *Diamictonic*, *Transilient*, *Hyponomes*, *Micronomes*, and heaven knows what nomes beside, dance the mazes.

We see where the shoe pinches. The English language, especially in geological matters, is overshadowing the langue universelle. Point de reméde! The English blood and tongue are doing wonders, physically and morally, all over the world. What unborn millions have to succeed us here, when we shall all be quietly stowed away in the Terrains Clysmiens! It animates us to think what great things will be achieved here, when the love and knowledge of nature will be diffused through this vast continent. G. W. F.

ADJUDICATION OF THE WOLLASTON MEDAL TO WILLIAM SMITH.

We were surprised to see in Dr. Brewster's "Edinburgh Journal of Science," for April 1831, some observations in article XIII. on the late adjudication of the Wollaston medal to William Smith, which would dispose persons at a distance from England,

to believe, not only that "English science was in a degraded and declining condition," but that "the few rewards which genius can command, are not judiciously conferred."

The late Dr. Wollaston left the Geological society £1000, and directed the interest to be applied in "promoting researches concerning the mineral structure of the earth, or in rewarding those by whom such researches might hereafter be made; or in such manner as should appear to the council of the said society for the time being, conducive to the interest of the society in particular, or the science of geology in general." He also enjoined the society "not to hoard the dividends parsimoniously, but to expend them liberally, and, as far as might be, annually, in furthering the objects of the trust."

On the 18th of February, 1831, the first award of this valuable and most honourable medal, was made to Mr. W. Smith, "in consideration of his being a great original discoverer in English geology; and especially for his having been *the first in this country, to discover and to teach the identification of strata, and to determine their succession, by means of their embedded fossils.*"

William Smith, a mineral surveyor by profession, drew up his tabular view of the strata exhibited in the district of Bath, in 1790. Upon this he subsequently raised the great geological truth of the regular succession of the formations. In 1815 his geological map of England appeared. This astonishing performance of an unassisted individual drew praises from all Europe. D'Aubuisson said of him, "That which the most distinguished mineralogists have effected for a small portion of Germany, in half a century, William Smith has undertaken and done for all England." What Newton did for our knowledge of the universe, by announcing the law of gravity, William Smith has done for our knowledge of the systematic structure of the crust of the earth, by making us acquainted with the unerring language of embedded fossils. To one mind only, belongs the glory of opening the eyes of mankind, to each of these great truths. That glory is indivisible in its nature. No human being, whilst time and civilization shall endure, can, from the nature of the case, ever dispute Mr. Smith's claims to this distinction.

We put it to the candour of Dr. Brewster himself, a distinguished benefactor to science, whether, upon the first distribution of Wollaston's honour, it was not justly and nobly done by the

members of the Geological society, who owe so much to his labours and genius, to draw Mr. Smith from his retirement, and confer upon him, by common consent, what he could so justly claim to receive; instead of practising the more calculating policy of opening a door to it for themselves, by his exclusion. Our private letters, from various friends present at the delivery of this medal, speak of the occasion as both impressive and affecting. It was a tribute publicly paid, by some of the most enlightened minds in Europe, to a pre-eminent leader in their science, in his old age. The act itself was, to us, a sufficient proof that English science was not in "*a degraded and declining condition.*" Looking at the wonderful progress geology has of late years made, and assigning their proper share of the merit of advancing this most liberal and attractive pursuit, to the English geologists; we should be inclined to hold up the progress of science in England to the admiration of the world.

We congratulate Mr. Smith most cordially upon the distinction conferred on him. Of a respectable, yet unpretending origin, he has been raised by some generous minds, to the rank of a prince of the order of nature. The thing has been well done. We know and honour the men who have done it, and many a happy day have we geologized with the venerable and amiable man they have delighted to honour.

In the admirable address of the Rev. Adam Sedgewick, president of the geological society of London, on the delivery of the Wollaston prize, after recapitulating the interesting history of Mr. Smith's discoveries, we find the following passage touching the difficulty he found in attracting the public attention to his labours. "He suffered, as many men of genius have done before him, in his peace and his fortune, from what, in our estimation, constitutes his chief honour—from outstripping the men of his own time in the progress of discovery."

We also quote with pleasure, the following eloquent passages.

"I for one can speak with gratitude of the practical lessons I have received from Mr. Smith: it was by tracking his footsteps, with his maps in my hand, through Wiltshire and the neighbouring counties, where he had trodden nearly thirty years before, that I first learned the subdivisions of our oolite series, and apprehended the meaning of those arbitrary and somewhat uncouth terms, which we derive from him as our master, which

have long become engrafted into the conventional language of English geologists, and through their influence, in part, also adopted by the naturalists of the continent.

"After such a statement, gentlemen, I have a right to speak boldly, and to demand your approbation of the council's award. I could almost dare to wish, that stern lover of truth, to whose bounty we owe the "donation fund"—that dark eye, before the glance of which all false pretensions withered, were once more amongst us. And if it be denied us to hope, that a spirit like that of Wollaston should often be embodied on the earth, I would appeal to those intelligent men who form the strength and ornament of this society, whether there was any place for doubt or hesitation? Whether we were not compelled, by every motive which the judgment can approve, and the heart can sanction, to perform this act of filial duty, before we thought of the claims of any other man, and to place our first honour on the brow of the father of English geology.

"If, in the pride of our present strength, we were disposed to forget our origin, our very speech would bewray us; for we use the language which he taught us in the infancy of our science. If we, by our united efforts, are chisseling the ornaments, and slowly raising up the pinnacles of one of the temples of nature, it was he that gave the plan, and laid the foundations, and erected a portion of the solid walls, by the unassisted labour of his hands.

"The men who have led the way in useful discoveries, have ever held the first place of honour in the estimation of all, who, in aftertimes, have understood their works, or trodden in their steps. It is upon this abiding principle that we have acted; and in awarding our first prize to Mr. Smith, we believe that we have done honour to our own body, and are sanctioned by the highest feelings which bind societies together."

We now quote the following passage from article XIII. of the Edinburgh Journal of Science, as furnishing the complete refutation of the general censure intended by it. "When a philosopher, however, carries on his inquiries by the sacrifice of a half, or even a third of his whole professional income, and when this loss is increased by the purchase of expensive apparatus; the acquisition of a pecuniary reward cannot be unwelcome, independent of the honour with which it is accompanied. Upon this principle, prizes should always be adjudged to the person who really deserves them," &c. &c.

This is Mr. Smith's case exactly; he has devoted the whole of his fortune towards the illustration of the geology of his native country: and this noble prize, founded by one of the ornaments of our race, has been adjudged to him, because he, more than any man alive, really deserved it. F.

THE EARL OF BRIDGEWATER'S BEQUEST.

The unjust censure which has been lately passed upon the Geological Society of London, for using the discretionary powers vested in them, in awarding the first Wollaston Medal to Mr. William Smith, will eventually lead to an inquiry into the manner in which all similar trusts have been executed both in Europe and this country. We therefore present our readers with the following very interesting statement. We ourselves consider Mr. Davies Gilbert to have acted with great judgment upon this occasion. Had he announced this splendid prize for the thousand and one writers, ever ready to enter the field, and to cabal with their friends for the preference, he would effectually have excluded the eminent persons he has appointed. They are not men to devote their time to objects of uncertain attainment. At present the world may be sure the important trust will be worthily executed, being confided to individuals who have every motive that can urge men to distinguish themselves, comprehending their own and their country's reputation, *and being well paid for their labours.* Editor.

"Statement respecting the Legacy left by the late Earl of Bridgewater, for rewarding the authors of works, to be published in pursuance of his Will, and demonstrative of the Divine attributes, as manifested in the Creation." By Davies Gilbert, M. P. V. P. R. S.

TO THE EDITORS OF THE PHILOSOPHICAL MAGAZINE AND ANNALS.

Gentlemen,—The following short statement respecting the late Earl of Bridgewater's legacy of eight thousand pounds, and of the final arrangements made in consequence of it, may possibly be thought not unworthy of a place in your Journal.

The Rev. and Right Honourable Thomas Henry Egerton, Earl of Bridgewater, died in the month of February, 1829, at Paris, leaving his last will and testament, bearing date on the 25th February, 1825, in which he desired and directed his trustees to lay

out and invest in their own names, in some one of the public stocks or funds of Great Britain, the sum of eight thousand pounds sterling; the said sum, with all accruing dividends thereon, to be held at the disposal of the President, for the time being, of the Royal Society of London, to be transferred, paid, and applied, according to the order and direction of the said President of the Royal Society, in full, and without any diminution whatsoever, in such proportions, and at such times, according to his direction and judgment, and without being subject to any control or responsibility whatever, to such person or persons as the said President, for the time being, of the aforesaid Royal Society, should or might nominate, or appoint, and employ. And he thereby declared his will and particular request to be, that some person or persons should be nominated and appointed by the said President, to write, print, publish, and expose to public sale, one thousand copies of a work on the power, wisdom, and goodness of God, as manifested in the Creation; illustrating such work by all reasonable arguments; as, for instance, the variety and formation of God's creatures in the animal, vegetable, and mineral kingdoms; the effect of digestion, and thereby of conversion; the construction of the hand of man, and an infinite variety of other arguments; as also, by discoveries, ancient and modern, in arts, sciences, and the whole extent of literature. And he desired that the profits arising from and out of the sale of the aforesaid work, should be paid by the said President of the Royal Society, as of right, as a further remuneration and reward, to such person or persons as the said President of the Royal Society should so nominate, appoint, and employ; with a further power to advance the sums of £300, and of £500, during the writing and printing of the said work.

The testator appointed John Charles Clarmont, Thomas Phillips, and Eugene Auguste Barbier, Esquires, executors and trustees of his will. And these gentlemen, on the 14th July, 1830, invested the devised sum of £8000, in the purchase of 3 per cent. consolidated Bank Annuities, which now stand in their names for the above specified purposes.

The late President of the Royal Society having ascertained from a noble Lord immediately connected with the deceased, that his family were desirous of having the objects of the bequest executed, proceeded as follows:—

He was fully aware of the duty imposed on him to select persons amply qualified for discharging in an adequate manner the task they would have to perform; and he was also impressed with the conviction, that, however carefully a selection might be made, several gentlemen must be omitted, possessing the requisite qualifications, equally, perhaps, with those who received the appointment.

For the purpose, therefore, of acquiring the most able assistance, and placing the whole transaction above even the suspicion of favouritism, or partiality, the late President was induced to request the aid of two individuals, as highly distinguished by their abilities and by their learning, as by the eminent stations which they hold in the hierarchy of this country, where able and intrepid champions have never been wanting to vindicate the natural and moral attributes of the Divinity against the equally dangerous attacks of infidelity, fanaticism, and imposture.

The two distinguished prelates, the Archbishop of Canterbury and the Bishop of London, most readily condescended to afford their assistance; and after much deliberation, and with the concurrence of the noble Lord above alluded to, the work has been placed in the hands of the following eight gentlemen.

The Rev. William Whewell, M. A. F. R. S. Fellow of Trinity College, and Professor of Mineralogy in the University of Cambridge.

The Rev. John Thomas Chalmers, Professor of Divinity at Edinburgh.

John Kidd, Esq. M. D. F. R. S. Regius Professor of Medicine in the University of Oxford.

The Rev. William Buckland, D. D. F. R. S. Canon of Christ Church, and Professor of Geology in the University of Oxford.

Peter Mark Roget, Esq. M. D. Sec. R. S.

Charles Bell, Esq. F. R. S. Surgeon.

The Rev. William Kirby, M. A. F. R. S.

William Prout, M. D. F. R. S.

Each being pledged to take a part, as designated by the testator, most adapted to his acquirements and to his pursuits: and thus it is confidently hoped and expected, that a work entrusted to such individuals, will appear, as a whole, worthy of the age and of the country about to give it birth.

INFLUENCE OF CLIMATE ON THE FRUITFULNESS OF PLANTS.

By a Correspondent.

The cultivated plants yield the greatest products near the northernmost limit in which they will grow.

I have been forcibly impressed with this fact, from observing the productions of the various plants, which are cultivated for food and clothing in the United States. The following instances will go far to establish the principle, viz:

The cotton, which is a tropical plant, yields the best staple, and surest product, in the temperate latitudes. The southern parts of the United States have taken the cotton market from the East and West Indies, both as regards quantity and quality. This is partly owing to the prevalence of insects within the tropics, but principally to the forcing nature of a vertical sun. Such a degree of heat developes the plant too rapidly—runs it into wood and foliage, which become injuriously luxuriant; the consequence is, there are but few seed pods, and these covered with a thin harsh coat of wool. The cotton wool, like the fur of animals, is, perhaps, designed for protection; and will be thick and fine in proportion as the climate is warm or cool. Another reason is to be found in the providence of the Deity, who aims to preserve races rather than individuals, and multiplies the seeds and eyes of plants, exactly as there is danger of their being destroyed by the severity of the climate, or other causes. When, therefore, the cares and labours of man counteract the destructive tendency of the climate, and guarantee their preservation, they are, of course, more available and abundant.

The lint plants, flax, hemp, &c. are cultivated through a great extent of latitude; but their bark, in the southern climates, is harsh and brittle. A warm climate forces these plants so rapidly into maturity, that the lint does not acquire either consistency or tenacity. We must go far north in Europe, even to the Baltic, to find these plants in perfection, and their products very merchantable. Ireland is rather an exception as to latitude; but the influence of the sun is so effectually counteracted there by moisture, and exposure to the sea air, that it is always cool: hence, the flax and potatoe arrive at such perfection in that region.

It holds equally true in the farinaceous plants. Rice is a tropical plant; yet Carolina and Georgia grow the finest in the world; heavier grained, better filled, and more merchantable,

than any imported into Europe from the Indies. The inhabitants of the East Indies derive their subsistence almost exclusively from rice; they must be supposed, therefore, to cultivate it with all skill and care, and the best contrivances for irrigation. Such is, however, the forcing nature of their climate, that the plant grows too rapidly, and dries away before the grain be properly filled. Indian corn, or maize, if not a tropical plant, was originally found near the tropics; and although it now occupies a wide range, it produces the heaviest crops near the northern limit of its range. In the West Indies it rises 30 feet in height; but with all that gigantic size, it produces only a few grains on the bottom of a spungy cob, and is counted on only as rough provender. In the southern part of the United States, it reaches a height of 15 feet, and will produce 30 bushels to the acre; in the rich lands of Kentucky and the middle states it produces 50 or 60 bushels to the acre; but in New York and New England, agricultural societies have actually awarded premiums for 150 bushels to the acre, collected from stalks only seven feet high. The heats of a southern sun develope the juices of this plant too quickly. They run into culm and blade, to the neglect of the seed, and dry away before fructification becomes complete.

Wheat is a more certain crop in New York, the northern part of Pennsylvania and Ohio, and in the Baltic regions of Europe, than in the south either of Europe or America. In the north, snows accumulate, and not only protect it from the winter colds, but from the weavil, Hessian fly, and other insects that invade it; and in the spring it is not forced too rapidly into head, without time to mature fully, and concoct its farina.

A cold climate also aids the manufacturing of flour, preserving it from acidity, and enables us to keep it long, either for a good market, or to meet scarcities and emergencies. Oats grow in almost every country; but it is in northern regions only, or very moist or elevated tracts, that they fill with farina suitable for human sustenance. Rye, barley, buckwheat, millet, and other culmiferous plants, might be adduced to illustrate the above principle; for all their habits require a more northern latitude than is necessary to their mere growth.

The grasses are proverbially in perfection only in northern and cool regions, although they will grow every where. It is in the north alone that we raise animals from meadows, and are enabled

to keep them fat, and in good condition, from hay and grass alone without grain. It is there the grasses acquire a succulence, and consistency enough, not only to mature animals, but to make the richest butter and cheese, that contribute so much to the table of the luxurious. The grasses which do, often, in the south, grow large enough, are without richness and nutriment; in hay, they have no substance; and when green, are too washy to fatten animals; the consequence is, most animals in those latitudes browse from necessity, and are poor, and without size or beauty. It is the same hot sun which forces them to a rapid fructification, before they have had time to concoct their juices. The sugar cane produces, perhaps, better where it never seeds, than in the tropics; for the juices will never ripen so as to granulate, until checked by frost or fructification. In the tropics, the cane grows twenty months before the juices ripen; and then the culm has contracted a woody, fibrous quality, to such a degree as to resist the pressure of the mills, and yields but little juice, and that to an increased effort. In Louisiana we succeed well with the sugar culture; because, whilst the culm is succulent and tender, a white frost checks the growth, ripens the juices, and in five months gives us a culm, tender, full of juice, easy to press, and yielding much grain of sugar. When Louisiana, therefore, acquires all the necessary skill, she will most probably grow this article cheaper than the West Indies.

Tobacco is a southern plant, but there it is always light and chaffy; and although often well-flavoured, it never gains that strong narcotic quality, (which is its only peculiar property,) unless you grow it as far north as Virginia. In the south, the heat unfolds its bud or gem too soon, forces into full expansion the leaf, and drives it to seed before the narcotic quality can be properly elaborated. We may assert a general rule applicable to all annual plants, that neither the root, nor the leaf, acquires any further size or substance after fructification.

The tuberose, bulbous, and other roots, cultivated for human and animal subsistence, are similarly affected by climate, and manifest habits in corroboration of the above principle. The Irish potatoe, although from or near the tropics, will not come to perfection but in northern or cool countries, or in moist, insular situations, as Ireland. It is in such climates alone, that its roots acquire a farinaceous consistence, and have size, flavour, and

nutriment enough to support, in the eminent way in which they are susceptible, animal life. In the south, a forcing sun brings the potatoe to fructification before the roots have had time to attain their proper size, or ripen into the proper qualities for nourishment. In Ireland the plant grows slow, through a long and cool season, giving time for its juices to be elaborated, and properly digested; hence that fine farina and flavour which characterizes them. The sweet potatoe produces larger, better flavoured, and more numerous roots in Carolina, where it never flowers, than in the West Indies. In the latter place this plant runs wild, covers the whole face of the earth with its vines, and is so taken up in making foliage, that the root becomes neglected, and is small and woody.—In order to have the onion in perfection, it must grow through two years, swelling all the time its bulbs. In the south, however, it seeds in one year, and before it has made much bulb. Beets, carrots, parsnips, turnips, radishes, and other roots, are equally affected by a hot sun, and scarcely worth cultivating far to the south. They all fructify before they have formed perfect roots, and make foliage at the expense of their bulbs; hence they will always be articles of commerce; the south will have to depend upon the north for them.

The sallad plants are in like manner affected by climate, and give further proofs of our assumption. Cabbages, lettuces, endive, cellery, spinage, plants whose leaves only are eat, to protect their germs from cold, (through a kind of instinct,) wrap them up in leaves, which form heads, and render many of their other parts tender and crisp for use. These leaves, thus protected, are not only tender, but more nutritious, because their growth has been slow, and their juices well digested. In the south, a relaxing sun lays open the very buds of such plants, gives a toughness and thinness to the leaves, and they are too unsubstantial for animal support, because of such quick and rapid developement.

The delicious and pulpy fruits are, in a still more striking way, illustrative of our principle. The peach, nectarine, plumb, apple, cherry, currant, gooseberry, apricot, and many other such families, are not in perfection in the south. It is in Pennsylvania, Virginia, Maryland, Jersey, and in the north of Europe, that we enjoy them, although, originally, they came from places near the tropics. The peach of the Carolinas is full of larvae, gum, and knots, and too stringy and forced to be juicy and flavoured. The

apple of the south is too acerb to be either eaten or preserved. The plumbs, apricots, cherries, currants, gooseberries, &c. will not even mature until we go far north. All the trees which bear these delicious fruits will grow luxuriantly in the south, make much foliage and wood, with but little pulp, and that unsavory. The kernel in the one-seeded fruit, seems to be the first object of nature in southern climes: that becomes strong, oily, and enlarged; and one of the peach family has so entirely neglected the pulp, that it has only a husky matter around the kernel, as the almond. The changeableness of the weather in the south, in the spring season, throws plants off their guard; the frosts attendant on those changes, destroy the young fruit; and it is only one year in three that the crop hits at all. The desiccated or dried state of these fruits enables us to enjoy them through the year; but in the south their acidity carries them into fermentation or decomposition before they can be divested of their aqueous parts. The climate of the south is equally against converting them into cider, or any other fermented liquor, because the heat forces their compressed juice so rapidly into an active fermentation, that it cannot easily be checked until it passes into vinegar. For the same reason distillation goes on badly in hot climates, and cannot be checked long enough at the proper point to give much alcohol; and whether we aim to enjoy the delicious freshness of these fruits themselves, sip the nectarin of their juices, refresh ourselves with their fermented beverage, stimulate our hearts with their brandies and cordials, or feast through the winter upon the dried or preserved stores of their fruits, we are continually baulked by the severity of a southern climate, and for such enjoyment must look to the north.

The melons are always affected by too great a degree of heat, even though their vines flourish so much in southern latitudes. The forcing sun hurries them on to maturity before they have attained much size, or acquired that rich saccharine and aromatic flavour for which they are so much esteemed. The cantelope melon will rot, or have its sides baked by a hot sun, before it is fully formed; and the water-melon is always woody, dry, and devoid of its peculiar sweetness and richness in the south. Vines have been known to run 100 feet, and bear no melon. It is in Philadelphia, and its neighbourhood, and in similar latitudes, that the markets are loaded with delicious melons of all sorts, whose

flavour so much refresh and delight us. It is there, near their northern limit, that we cultivate them with such uniform success.

The orange, strictly a tropical plant, is more juicy, large, and delicious, at St. Augustine, (Florida,) than at Havana; and fruiterers, in order to recommend an orange, will say that it is from some place out of the tropics. In the West Indies, the pulp of the orange is spungy, badly filled with juice, and has too much of a forced flavour to be pleasant. The hot-house forcers of Europe, or at Rome, anciently at first produced bad fruit; too dry, too small, and without flavour; because they overacted. They have lately found out that fact, and now the productions of the hot houses of London, Paris, &c. astonish and delight us with the quantity and excellence of the fruit. They have found out that gradual and uniform heat is the desideratum; countervailing the cold, rather than imparting much heat. Fruit thus produced, is pronounced better than any grown in the natural way, however perfect the climate.

The juices of the grape are best matured for wine near the northern limit of their growth. On the Rhine, in Hungary, the sides of the Alps, and in other elevated or northern situations, the wine is strongest, richest, and most esteemed. The French wines rank before the Spanish and Italian; and in no southern country of Europe or Africa, except Madeira, where elevation makes the difference, is the wine in much repute. The grapes of France are more delicious for the table than those of Spain or Madeira. In the southern part of the United States, the excess of heat and moisture blights the grape to such an extent, that all attempts have failed in its cultivation. The grape vine, however, whether wild or cultivated, grows there very luxuriantly. The vinous fermentation can also be best conducted in a climate comparatively cool; and all the pressing, fermenting, and distillation of the juice of this delicate fruit, can be safer and more profitably managed in a mild region.

The olive, and other oleaginous plants, yield more fruit, of a richer flavour, and can be better pressed, and the oil preserved, in a mild climate. In France the tree is healthier, and the fruit and oil better than in Spain or Italy; and the Barbary States are known to import their oil from France and Italy.

Many other plants might be named, whose habits would equally support our position. It is presumed, however, that

enough have been cited to call the attention of philosophy to this curious subject, and enable us to give proper attention to it, in all the practical operations of agricultural pursuit. Much time and expense might be saved, and profits realized, if this were more generally understood.

We have already observed, that the heat of the sun in southern climes forces plants to a false maturity, runs them on too rapidly to fructification, and renders dry and woody the culms, stalks, and leaves of the plants, where these parts are used. Hence the chaffiness of the leaf, the dryness of the culm, the lightness of the grain, and the unsavory spungy quality of the pulp of the plants in those latitudes. Hence the difficulty of fermenting their juices, distilling their essences, and preserving for use the fruit, juice, or blades of such plants. The prevalence of insects is another bar to the productiveness of southern plants: swarms of them invade and strip the leaves, bore the fruit, and lead to blight and decomposition; and just in proportion as the labours of man have rendered plants succulent, and their fruits and seeds sweet and pleasant, do these insects multiply on them, devour their crops, and defeat the objects of husbandry.

The labour of man too is more conservative in northern climates, because his arm is better nerved for exercise, his health and spirits more buoyant; and instead of saying, "go and work," he says, "come and work;" treads with a cheerful heart upon his own soil, and assists in the cultivation, collection, and preservation of his own productions. It is in temperate climates that man can be most familiar with nature; it is there he has the best opportunities of observing the guarantees which nature has for the preservation of her animals and plants against the devastation of the elements; he sees an occasional apparent neglect of individuals, but a constant parental care of races. In every thing he sees the wisdom and benevolence of God. W.

SCIENTIFIC MEMORANDA.

We are indebted to our friends of the Lyceum of natural history at New York, for the following report. We announce for our next number a general paper on the osteological remains of extinct animals found at Big Bone lick, in which the bones

noticed in this report will be examined in detail. The able friend to whose pen the scientific public will be indebted on this occasion, is a perfect master of the subject, and has personally examined that remarkable Kentucky deposit. EDITOR.

REPORT of Messrs. Cooper, J. A. Smith, and Dekay, to the Lyceum of Natural History, on a collection of fossil bones disinterred at Big Bone Lick, Kentucky, in September, 1830, and recently brought to this city, (New York.)—Read May 30, 1831.

The Committee beg leave respectfully to report, that these bones, having been landed only within a very few days, sufficient time has not been afforded them, for the accurate determination of every imperfect, or mutilated fragment. The greater part, however, belonging to well known animals, were immediately recognized, and it is not believed that anything of much importance will be hereafter observed. They therefore submit, this evening, a general account of this collection, reserving, for a future occasion, such further particulars as may be deemed of sufficient interest.

The remains of the great Mastodon compose more than one half the entire quantity of which this collection consists. Among them is a head, which, though not entire, is in better preservation than any of this animal heretofore discovered. It enables us to form a better idea of the figure of this important part, than could hitherto be obtained. It is found to have the cranium much depressed, in which it deviates remarkably from the elephant. Both the tusks are preserved, one having been found still in the socket, and the other lying at a short distance off.

Of other large tusks, there are besides, five that measure from six and a half to twelve feet in length, and many more large fragments of others.

Six portions of upper jaws, all containing teeth.

Fifteen portions of lower jaws, twelve of which contain from one to three grinders each.

Besides these, there are seventy-three detached molar teeth of all sizes, some of them as large as any yet discovered.

Of the large bones of the anterior extremity, there are five scapulæ, seven humeri, three ulnæ, and one radius, more or less perfect.

Of the posterior extremity, six ossa innominata, ten femora,

and five tibiæ. Some of these are almost entire; others are much mutilated.

It is necessary to observe, that although these large bones, as well as the detached tusks, have all been provisionally referred to the Mastodon, yet it is not improbable that on a further comparison, a part may be found to belong to the fossil elephant. The mutilated condition of some, renders it extremely difficult to pronounce with certainty upon a slight examination.

The remains of the fossil elephant comprised in this collection, are next in interest and number, to those of the mastodon.

The first that we shall notice, is the head of a young individual, more complete than any known to your committee to have been, as yet, obtained in North America. It consists of the upper and lower maxillary bones, with six molar teeth in good preservation. Isolated grinders of the elephant have been discovered in the United States in numerous instances, but generally without any portion of bone adhering to them. There are also of the elephant in this collection, several other large fragments of jaws, and twenty separate molar teeth.

Of the horse, there are perfect teeth, and other portions, found under circumstances that favour the belief of their being of equal antiquity with the extinct animals whose remains are associated with them in the collection. The teeth are remarkably large and sound.

Of ruminating animals, there are skulls and other parts of the Buffalo, *Bos Americanus;* of the extinct species named by Dr. Harlan, *Bos bombifrons;* and of a large species of *Cervus*, resembling *C. alces.*

Finally, we have also discovered among these interesting relics, some considerable portions of the *megalonyx*, whose osteology is still so imperfectly known. The most important of these is a right lower maxillary bone, with four teeth in the socket, and another detached tooth which appears to have come from the upper jaw. There is also a tibia of the right leg, and perhaps some other bones which may prove to belong to the same animal.

Mr. Cooper's Denial.—Mr. Cooper has requested us to state, that he never expressed the opinion attributed to him in the American Journal of Science and Arts, for April, 1831, respect-

ing a fossil supposed by Mr. Eaton to be a petrified crolalus. On the contrary, he told Mr. E., that he thought it a plant, and in writing to Dr. Torrey shortly after, mentioned that it was a plant of the family Lycopo diaceæ. It never entered into his mind to refer it to Arundo, which belongs to a very different tribe of plants.

This public denial has been rendered necessary by the following passage of Silliman's Journal, at page 173, in the number above alluded to.

"One of our most accurate devotees to the study of recent organic relics, William Cooper, Esq. of the New York Lyceum, has examined it. He is in doubt, but is inclined to believe it an arundo, or some plant of that family. EDITOR."

Megalonyx Laqueatus.—Dr. Harlan read a paper, March 8, 1831, before the Academy of Natural Sciences of Philadelphia, descriptive of the fossil bones of a new species of the megalonyx, discovered in White cave, Kentucky.

The bones of the megalonyx Jeffersonei, were discovered in 1796, buried two or three feet beneath the surface of a cave in Green Briar county, Virginia. Those of the megalonyx laqueatus, now described, were found on the surface of the floor of White cave. They consist of two claws of the fore feet; a radius, humerus, scapula, one rib, and several fragments; the oscalcis, tibia, a portion of the femur; four dorsal, and one lumbar vertebra; a portion of a molar tooth, from the fluted appearance of which the specific appellation, (laqueatus,) is derived. Dr. Harlan has illustrated his paper with three lithographic engravings.

On the same evening, Dr. Harlan read a paper descriptive of an extinct species of fossil vegetable of the family Fucoides. This paper, with a lithographic engraving, is published with the preceding one in the Transactions of the Academy of Natural Sciences of Philadelphia. The fossil appears to have been imbedded in the millstone-grit formation: is singularly beautiful, and has been named by Dr. Harlan, "Fucoides Alleghaniensis."

Biennial Election of President of the Geological Society of London.—At a meeting held at the Society's Rooms, Somerset house, on the 18th February, 1831, Roderick Impey Murchison,

Esq. F. R. S., &c. &c. &c., was elected President for the next two years, in the place of the Rev. Adam Sedgewick, whose term of office expired on this day.

Death of Capt. Foster, of the Chanticleer.—We had the pleasure of knowing this distinguished navigator, and can feel the extent of the loss science has sustained by his premature death. He was one of those untiring and judicious minds appointed to accompany Sir Edward Parry in his adventurous expeditions into the Arctic Circle; and, had he lived, would have ranked as one of the most distinguished individuals of this very scientific age.

At the close of the year 1827, the Royal Society's Copley Medal was awarded to him for his observations at Port Bowen. In presenting the medal, the President expressed a hope, that so distinguished a mark of the approbation of the Royal Society might induce the government to bring forward a man of such bright promise as Lieut. Foster. *On the very same evening he received a letter from the Admiralty, with his brevet,* appointing him commander of the Chanticleer, with instructions to explore the high southern latitudes, and with liberty to sail round the world, without restraint as to time. He had been out about three years at the time of his death. This event will occasion a great sensation amongst his numerous friends, who were looking for his return with much anxiety.

The accessions to physical knowledge, that the scientific world will owe to the energy and genius of this lamented commander, will be perused with a melancholy interest by all who had the satisfaction of knowing him. EDITOR.

From the Literary Gazette, April 1831.

"It is with much regret we learn, by letters received on Thursday, the untimely fate of Capt. Foster, of his majesty's ship Chanticleer, who had been employed the last three years on a scientific expedition, in various parts of the globe, and was about to return to this country. Capt. F. had left his ship for the purpose of making a series of rocket observations on the Isthmus of Panama, and on his return down a small and shallow river in a canoe, he is said to have fallen overboard, and to have been drowned. But strong suspicions exist for believing, that this young, gifted and meritorous officer was most treacherously murdered."

Bone Caves in New Holland.—An interesting discovery has been made of osseous breccia and caves, about 210 miles west from Sydney. Major Mitchell, Surveyor General of New South Wales, has transmitted specimens and drawings of them to the Geological Society of London. The caves are in a limestone formation, in Wellington Valley, and the bones were discovered in an inferior chamber of one of the caves. The breccia is found in the fissures of the limestone, consisting of bones imbedded in an ochreous cement. A few of the bones belong to the dasyurus, the rest to the kangaroo, wombat, koala, phalangista. All the bones, with the exception of one, which appears to belong to some large marine quadruped, are of the present races of animals found in New Holland.

From a consideration of all the circumstances connected with this discovery, the following conclusions present themselves:—

1st. That the caves are of that class first brought into notice by the Rev. Dr. Buckland.

2. That the osseous breccias of Gibraltar, Antibes, Nice, Naples, Dalmatia, the island of Cerigo, &c. containing the remains of animals of the same kind, are probably of the same age, and an effect of the same cause, with the breccias of New Holland.

3. That this unexpected agreement strengthens the diluvial theory consequent upon elevation from below, and is opposed to that which attempts to account for the modification of the earth's surface by local causes.

4. That the present order of nature in New Holland, is of a great antiquity, and perhaps coeval with the insular position of the territory. EDITOR.

NEW PUBLICATIONS.

WE take this opportunity of stating the conduct we shall observe respecting new publications. Any blandishments laid in our way to procure praise for works which do not deserve it, will be thrown away upon us, as we shall never insert puffs of any kind. To be upon the most friendly terms with Booksellers, is our interest, as well as our inclination; but it is to the public at large we look for efficient patronage, and we are bound by every consideration to deal intelligently and fairly with it. On the other hand, we shall be most happy, upon all occasions, to notice in a favourable manner, works connected with the Study of Nature, which we have good reason to believe are of sterling value; and in announcing the following, which are about to appear, we cannot but express our satisfaction at such manifest evidences of the increasing demand for works on the Natural Sciences. EDITOR.

IN THE PRESS.

THE ANIMAL KINGDOM, arranged in conformity with its organization: by Baron Cuvier, perpetual secretary to the Royal Academy of Sciences, &c. &c. &c. The CRUSTACEA, ARACHNIDES, and INSECTA, by P. A. Latreille, Member of the Royal Academy of Sciences, &c. &c. &c. Translated from the French, with notes and additions, by H. M'Murtrie, M. D. &c. &c. In four volumes 8vo., with plates. New York. G. & C. & H. Carville.

Dr. M'Murtrie's translation of this great work is upon the eve of being published. We intend, in a future number, after its publication, to speak of its great merits, to

which, having seen the book, w[illegible] a willing testimony. The translator has given evidence, in this work, to the [illegible] public, that he possesses the requisite qualifications of a scholar and a nat[illegible] is printed by James Kay, jun. & Co. in their usual beautiful manner.

RIODICAL.

Dr. Troost, and Mr. Le S[illegible], now residing at Nashville, Tennessee, are about to commence the publication of a periodical work, in which they intend to describe the natural productions of that state. They propose to describe its Geology and Mineralogy, and particularly its fossil organic remains; also its animals of various classes, accompanied with coloured engravings. The known qualifications of these gentlemen, encourage us to look for very interesting contributions to natural science.

AMERICAN EDITIONS OF ENGLISH WORKS.

IN THE PRESS.

"A Preliminary Discourse on the Study of Natural Philosophy, by J. F. W. Herschell, Esq. A. M. late Fellow of St. John's College, Cambridge," &c. &c. &c. Carey and Lea.

We can most truly say of this work, that it is one of the noblest productions of the human mind. On rising from the perusal of it, the first thought is always to read it over again; not because it is not comprehended, but because of the dignity, the beauty, and the vast extent of knowledge, which the gifted author has imbued it with. If ever there was a work capable of teaching men how to think correctly, it is this highly philosophical production.

The "Journal of a Naturalist," is also about to appear from the press of Carey and Lea. In this pleasing work the author has been true throughout to his attractive motto:

"——Plants, trees, and stones, we note;
Birds, insects, beasts, and rural things."

Messrs. Carvilles, of New York, have in the press "*Lindley's New Elementary Work on the Natural Orders of Plants*, with notes and additions by Professor Torrey.

We think this work will be popular here; we know of no book that can supply its place with those who are desirous of obtaining a knowledge of the philosophy of plants. Dr. Torrey's name is a guarantee for science and fair dealing; we therefore do not doubt that his notes and additions will add to the intrinsic value of the publication. Hitherto empirical note makers have too often been successful in bringing important British productions into discredit here; and we know of an instance where a celebrated English writer, cordially attached to this country, has been, by such means, taught to dread the republication of his works in the United States, where he was particularly solicitous to appear to advantage. We intend to keep an eye on these parasitical scribblers, and if any conspicuous individual of that genus shall in future come within the length of our Caduceus, we shall certainly give him a rap on the knowledge-box that will "make the empty dome resound."

"Ornithological Biography; or an Account of the Habits of the Birds of the United States." By J. J. Audubon, F. R. S. E. & L. &c.—one vol. royal 8vo.

This book is a worthy companion to Mr. Audubon's great work, the "Birds of America," which Cuvier has pronounced to be "the most magnificent monument which has until now been raised to Ornithology."

We shall give our readers an extract from it in our next number.

A work on *Baths and Mineral Waters*, by John Bell, M. D., will soon be published at the office of the Journal of Health. It will be the object of the author to exhibit clearly and succinctly the benefits to be derived, in the preservation of health and the cure of disease, from the use of cold, warm, sea, and vapour baths; and to indicate the circumstances under which the use of each, respectively, would be prejudicial. In the second part of the work, the author will introduce all the material facts and experience, as far as they can be collected, respecting the most noted Mineral Springs of the United States; and compare them with those of a similar nature in Europe. The precautions in respect to the diet and exercise to be adopted by invalids who have recourse to bathing and drinking mineral waters, will be laid down with suitable precision.—The work will form about 300 pages duodecimo.

From the known talents of the author, and the attention he has paid to the subjects embraced in this work, we have every reason to believe it will be one of standard merit.